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(71) Applicant(s)

Samsung Display Devices Co Ltd

(Incorporated in the Republic of Korea)

575 Shin-Dong, Paldal-gu, Suwon City, Kyungki-do,
Republic of Korea

(72) Inventor(s)

Hyeon-chang Park

(74) Agent and/or Address for Service

Elkington and Fife

Prospect House, 8 Pembroke Road, SEVENOAKS,
Kent, TN13 1XR, United Kingdom

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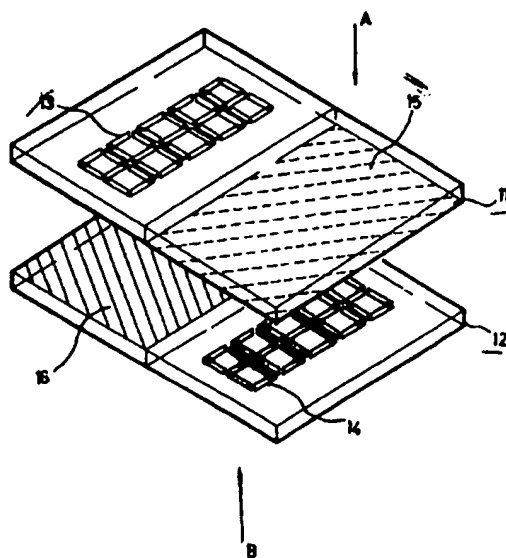
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(54) Liquid crystal display

(57) A liquid crystal display has an upper substrate (11), a lower substrate (12), and a liquid crystal layer between the upper and lower substrates. First segment electrodes (13) are formed in one portion of the upper substrate (11), and a first common electrode (15) is formed in the other portion. A second common electrode (16) is formed on the portion of the lower substrate (12) corresponding to that of the first segment electrodes (13), and second segment electrodes (14) are formed on the portion of the lower substrate (12) corresponding to that of the first common electrode (15). The dual-faced liquid crystal display enables observation of identical data on front and rear surfaces, with use of only a single liquid crystal cell.

FIG. 1



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FIG. 1

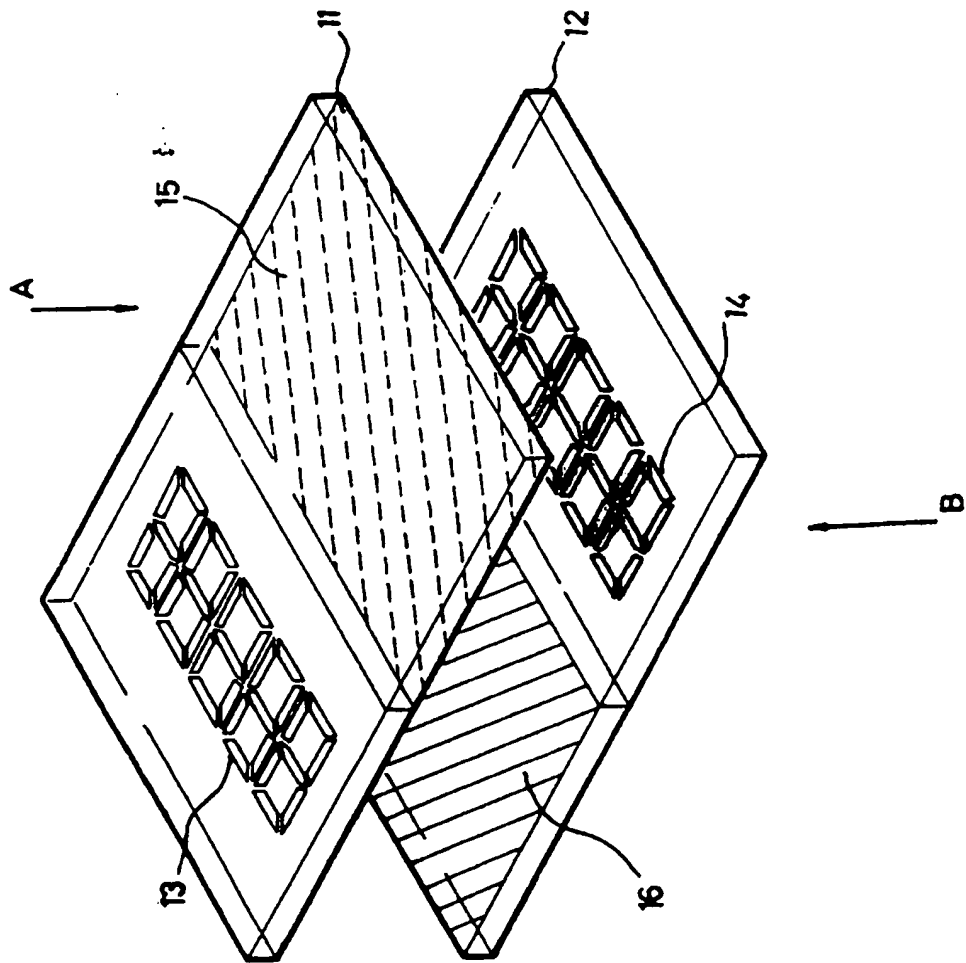


FIG. 2

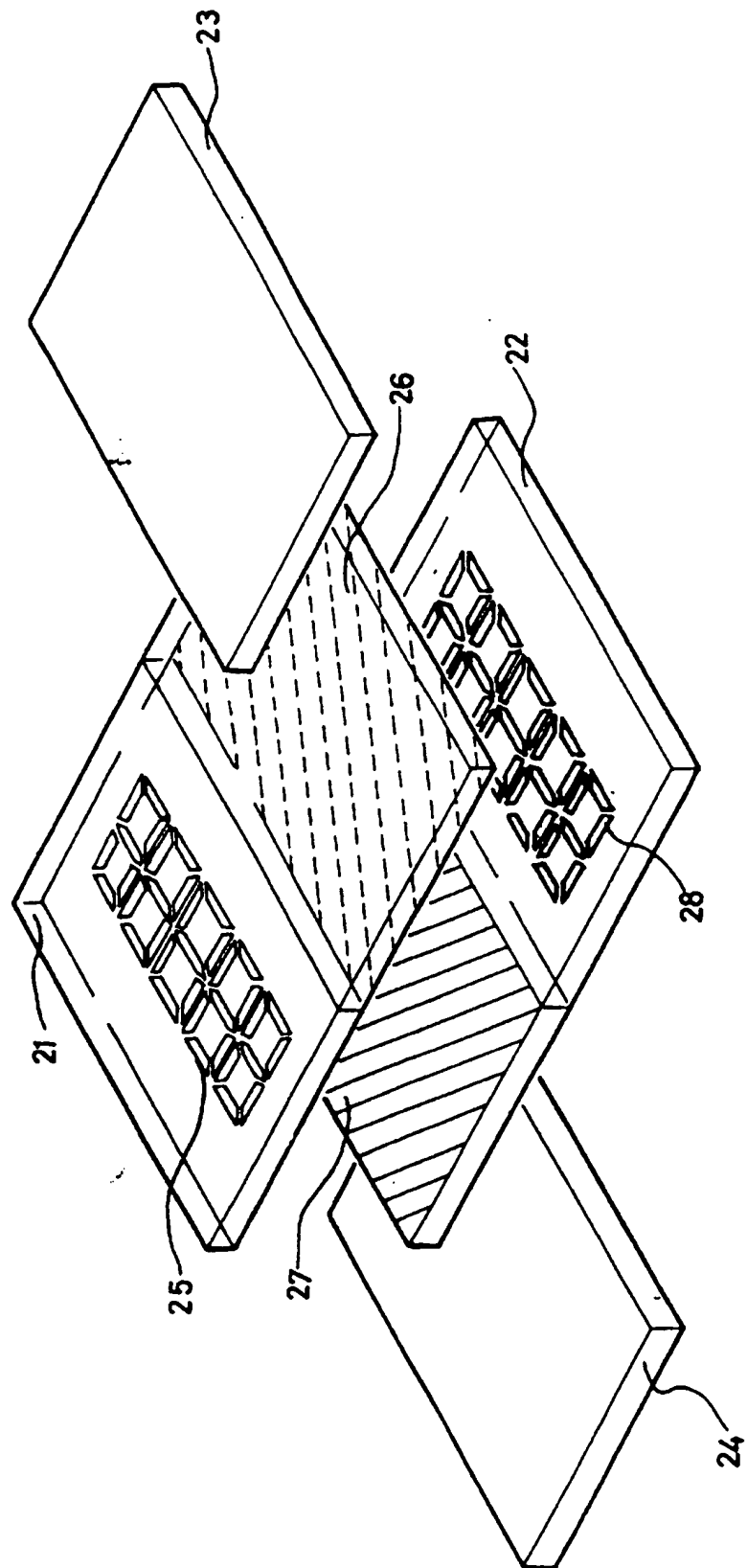
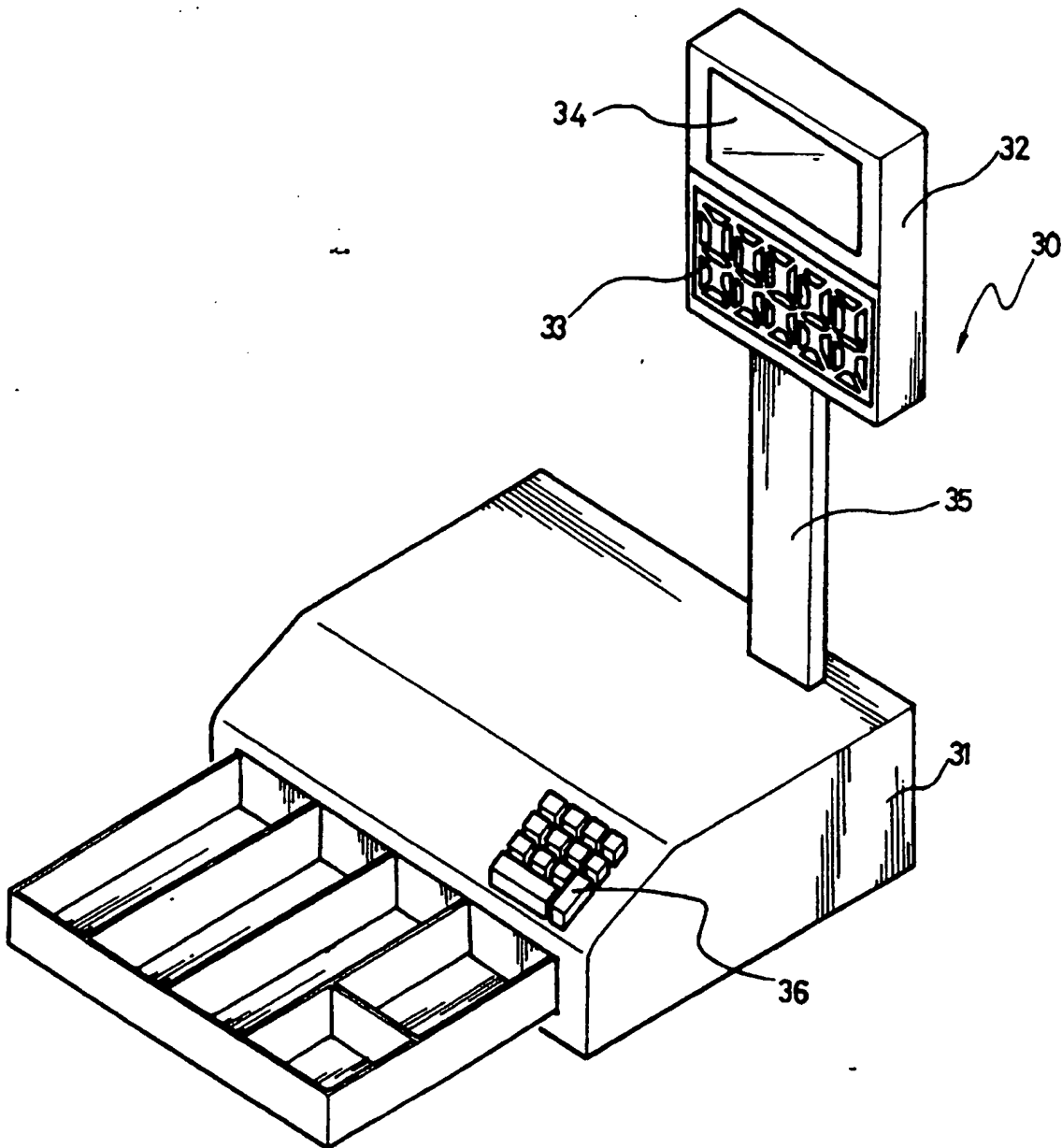


FIG. 3



LIQUID CRYSTAL DISPLAY

5 The present invention relates to a liquid crystal display (LCD), and more particularly, to a dual-faced LCD for displaying identical data on front and rear surfaces thereof.

10 An LCD, being a kind of flat display device, is generally formed by injecting liquid crystal between substrates on which electrodes are formed, and it displays visual data by changing the arrangement of the liquid crystal in accordance with application of current to the electrodes. An example of the applications of the LCD is in a cash register used in a store. Such a cash register uses the LCD to display the prices of
15 purchased products and the total sum thereof. Here, as the prices are input to the cash register, each price is displayed on an LCD so that a clerk may confirm the input. A conventional cash register, however, has only one LCD installed at a position favorable to the clerk, thus precluding viewing by a customer.

20 In an effort to circumvent this problem and allow both the clerk and the customer to view the display at the same time, it has been suggested to provide two LCDs whose rear surfaces are in contact with each other. However, since this display device uses two individual displays, two sets of electrical equipment
25 for driving the LCDs are needed, the display device becomes overly thick, and its fabrication cost is increased.

30 To overcome the above problems, it is an object of the present invention to provide a dual-faced LCD for displaying

identical data on the front and rear surfaces thereof.

It is another object of the present invention to provide a dual-faced LCD having backlights formed on portions of the front and rear surfaces thereof.

5 To achieve the above object, there is provided a liquid crystal display comprising an upper substrate, a lower substrate disposed to face the upper substrate, liquid injected between the upper and lower substrates, and common and segment electrodes formed on the facing surfaces of the substrates, wherein first
10 segment electrodes are formed on one portion of the surface of the upper substrate, and a first common electrode is formed on the other portion of the surface thereof, and wherein a second common electrode is formed on the portion of the surface of the lower substrate corresponding to the portion of the upper
15 substrate having the first segment electrodes, and second segment electrodes are formed on the portion of the surface of the lower substrate corresponding to the portion of the upper substrate having the first common electrode.

20 Preferably, backlight means is installed on the rear portion of the surface having the common electrodes in the upper and lower substrates, respectively.

25 Preferably, the backlight means is one of a cold cathode fluorescent tube, a light emitting diode and an electronic luminescent diode.

Specific embodiments of the present invention are described in detail below, by way of example, with reference to the attached drawings, in which:

4 FIG. 1 is an exploded perspective view of main portions of a liquid crystal display according to an embodiment of the present invention;

5 FIG. 2 is an exploded perspective view of main portions of a liquid crystal display according to another embodiment of the present invention; and

FIG. 3 is an exploded perspective view of a cash register to which a liquid crystal display according to an embodiment of the present invention is applied.

10

FIG. 1 is a schematic exploded view of main portions of a dual-faced LCD according to the present invention. The dual-faced LCD is comprised of an upper substrate 11, a lower substrate 12, and a liquid crystal layer (not shown).

15 As shown in FIG. 1, electrodes are formed on the lower surface of the upper substrate 11 and the upper surface of the lower substrate 12. Each of the upper substrate 11 and the lower substrate 12 is divided into two halves and has a common electrode on one half and segment electrodes on the other half.
20 Here, though the substrates are shown divided into halves, division into any number of parts is possible, as desired.

First segment electrodes 13 for displaying figures are formed on one half on the lower surface of the upper substrate 11, and a first common electrode 15 is formed over the other
25 half. In the lower substrate 12, second segment electrodes 14 are formed on the same half of the upper surface thereof as the first common electrode 15, and a second common electrode 16 is formed over the same half as the first segment electrodes 13. The LCD

shown in FIG. 1 enables the simultaneous observation of data displayed on the front and rear surfaces thereof. That is, assuming that a clerk views data from a direction "A," a customer can simultaneously view the same data from a direction "B."

5 FIG. 2 illustrates another embodiment of a dual-faced LCD according to the present invention. In this embodiment, first segment electrodes 25 and first common electrode 26 formed on an upper substrate 21 and a second common electrode 27 and second segment electrodes 28 formed on a lower substrate 22 are
10 identical to those of FIG. 1. The dual-faced LCD shown in FIG. 2 is provided with backlights 23 and 24 half as large as the upper and lower substrates 21 and 22, to increase the contrast of liquid crystal display. The backlight 23 is installed in the upper substrate 21 on the rear portion of the half surface having
15 a first common electrode 26 formed thereon, and the backlight 24 is installed in the lower substrate 22 on the half having the second common electrode 27 formed thereon. A cold cathode fluorescent tube, a light-emitting diode or an electronic luminescent diode can be used as the backlights 23 and 24.

20 FIG. 3 illustrates a dual-faced LCD of the present invention applied to a cash register. A cash register 30 is provided with a dual-faced LCD portion 32 supported by a supporter 35 on a main body 31. The LCD portion 32 is divided into an upper part 34 and a lower part 33. From the point of view of a clerk, figures input
25 from a keyboard 36 are displayed on the lower part 33. A customer can see the same data on the rear surface of the upper part 34.

The dual-faced LCD according to the present invention enables observation of identical data on the front and rear

surfaces thereof only with a single liquid crystal cell, thus increasing convenience.

CLAIMS:

1. A liquid crystal display comprising an upper substrate,
a lower substrate disposed to face said upper substrate, a liquid
crystal layer between said upper and lower substrates, and first
5 and second common and segment electrodes formed on the facing
surfaces of said substrates,

wherein first segment electrodes are formed on one portion
of the surface of said upper substrate, and the first common
electrode is formed on the other portion of the surface of said
10 upper substrate, and

wherein the second common electrode is formed on the portion
of the surface of said lower substrate corresponding to said
portion of said upper substrate having said first segment
electrodes, and second segment electrodes are formed on the
15 portion of the surface of said lower substrate corresponding to
the portion of said upper substrate having said first common
electrode.

2. A liquid crystal display as claimed in claim 1, wherein
backlight means is installed on the rear portion of the surface
20 having said common electrodes in said upper and lower substrates,
respectively.

3. A liquid crystal display as claimed in claim 2, wherein
said backlight means is one of a cold cathode fluorescent tube,
a light emitting diode and an electronic luminescent diode.

4. A liquid crystal display substantially as described
25 herein with reference to Figures 1 and 2 of the accompanying
drawings with or without reference to Figure 3.

5. A cash register comprising a liquid crystal display as
claimed in any of claims 1 to 4.

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